Industrial Parameter Monitoring using Internet of Things

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Abstract- The advent of low-power processors, intelligent wireless networks, and low-power sensors coupled with "Big Data" analytics has led to what's become a booming interest in the industrial Internet of Things (IoT). Put simply, this combination of technologies enables a multitude of sensors to be put anywhere: not just where communications and power infrastructure exists, but anywhere valuable information is gleaned regarding the how, where, or what of a given "thing". In On World's global survey of industrial WSN users, reliability and security are the two most important concerns cited. The Proposed system develops a sensor interface device essential for sensor data acquisition of industrial Wireless Sensor Networks (WSN) in Internet of Things (IOT) environment. The main stream of the project is to implement sensible device interface for WSN based on IOT. This project automates the Industrial monitoring system with IOT by employing Wireless Sensor Networks which avoids manual mistakes and ease of access to the end user. With this the continuous monitoring and control of these sensor nodes can be done with real time data, attained with good reliability and security.

Key Words- IOT, WSN, PIC, Temperature sensor, Gas sensor, Vibration sensor

I. INTRODUCTION

Today sensors are everywhere. We take it for granted, but there are sensors in our vehicles, in our smart phones, in factories controlling CO2 emissions, and even in the ground monitoring soil conditions in vineyards. While it seems that sensors have been around for a while, research on wireless sensor networks (WSNs) started back in the 1980s, and it is only since 2001 that WSNs generated an increased interest from industrial and research perspectives. This is due to the availability of inexpensive, low powered miniature components like processors, radios and sensors that were often integrated on a single chip (system on a chip (SoC)). The idea of internet of things (IoT) was developed in parallel to WSNs. The term internet of things was devised by Kevin Ashton in 1999[4] and refers to uniquely identifiable objects and their virtual representations in an "internet-like" structure. These objects can be anything from large buildings, industrial plants, planes, cars, machines, any kind of goods, specific c parts of a larger system to human beings, animals and plants and even specific body parts of them. While IoT does not assume a specific communication technology, wireless communication technologies will play a major role, and in particular, WSNs will proliferate many applications and many industries. The small, rugged, inexpensive and low powered WSN sensors will bring the IoT to even the smallest objects installed in any kind of environment, at reasonable costs. Integration of these objects into IoT will be a major evolution of WSNs.

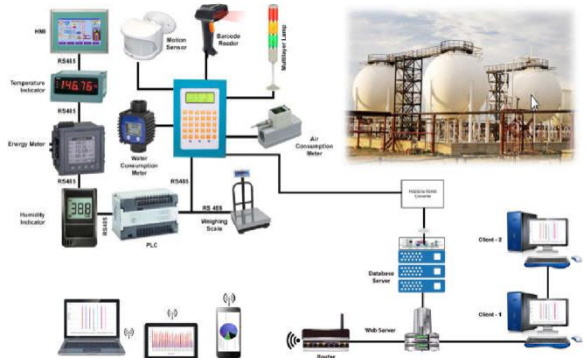


Fig.1: Wired Industrial Parameter Monitoring System

A. EXISTING SYSTEM

Wired communication technique Monitoring of the data is confined to the vicinity of the system.

The Major disadvantages of the existing system are

· Installation cost is high

- Difficult to find the fault in wired communication.

B. PROPOSED SYSTEM

Wireless Data Transfer . Monitoring of data can be viewed anywhere in the cloud. Fast Response and abnormal condition alert system. One time Installation and fast response.

C. ARCHITECTURE AND WORKING THEORY

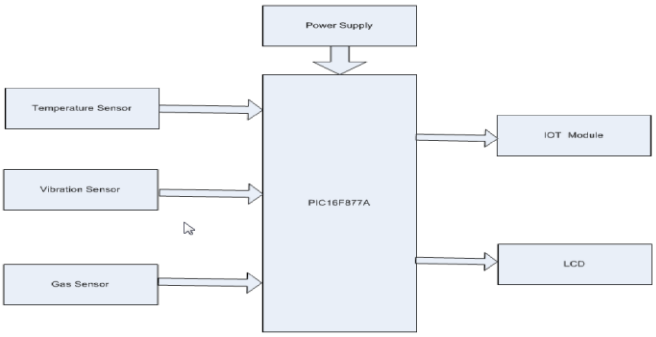


Fig.2: Block diagram

According to the project, we are using PIC micro controller, Sensors and IOT module as the main important components of our project. Sensors are connected to the input of the Controller. The values from the sensors are read by the Analog Inputs of the PIC controller. These sensor values are continuously monitored in the code and when the corresponding threshold levels are reached, the system treats as an abnormality and the data is sent to the IOT module using UART. The IOT module logs the sensor data on a web page through in built GPRS .Now we have a web page that has all the data logged that can be accessed from any point of the world through Internet.

D. HARDWARE MODULES USED:

a. PIC controller:-

PIC is a Peripheral Interface Microcontroller which was developed in the year 1993 by the General Instruments Microcontrollers. PIC are the world's smallest microcontrollers that can be programmed to carry out a huge range of tasks. The PIC is based on RISC architecture. Its memory architecture follows the Harvard pattern of separate memories for program and data, with separate buses. PIC microcontrollers are used in different new applications such as smart phones, audio accessories, advanced medical devices. These microcontrollers are found in many electronic devices such as phones, computer control systems ,Alarm systems Embedded Systems, etc. The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction execution, 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to- Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

b. Temperature sensor:-

Fig.3: Temperature sensor LM35

TheLM35 pin diagram is shown in the figure 2 .As a temperature sensor, the circuit will read the temperature of the surrounding environment and relay temperature to us back in degrees Celsius. The LM35 is a low voltage IC which uses approximately +5VDC of power. This is ideal because the Arduino's power pin gives out 5V of power. The IC has just 3 pins, 2 for the power supply and one for the analog output. The output pin provides an analog voltage output that is linearly proportional to the celsius (centigrade) temperature. Pin 2 gives an output of 1 millivolt per 0.1°C (10mV per degree). So to get the degree value in celsius all that must be done is to take the voltage output and divide it by 10- this give out the value degrees in celsius.

c. Vibration sensor:-

Fig.4: VIBRATION SENSOR

Humidity is that the presence of water in air. The amount of water vapor in air could have an effect on human comfort yet as several generating processes in industries. The presence of water vapor conjointly influences varied physical, chemical, and biological strategies. Humidness hobby in industries is crucial because of it want to have an effect at the enterprise charge of the products and moreover the fitness and safety of the personnel. Hence, humidness sensing is extremely necessary, especially in the control structures for industrial approaches and human comfort. Controlling or observance humidness is of dominant significance in several industrial & domestic applications. In semiconductor business, humidness or wet stages ought to be nicely managed & monitored all through wafer manner. In scientific applications, humidness Management is needed for metabolism equipment's, sterilizers, incubators,
pharmaceutical process, and biological merchandise. Humidness control is additionally necessary in chemical gas purification, dryers, ovens, movie desiccation, paper and fabric manufacturing, and meals manner. In agriculture, interest of humidness is essential for plantation safety (dew prevention), soil wet observance, and so on. For home applications, humidness management is wanted for dwelling environment in buildings, cookery control for microwave ovens, and so on. Altogether such applications and plenty of others, humidness sensors are used to supply a sign of the wet levels within the ecosystem. The following figure shows Humidity sensor.

d. Gas sensor:-

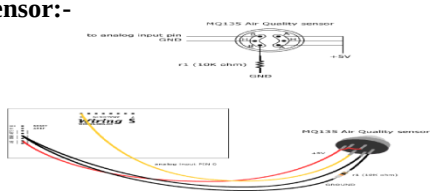
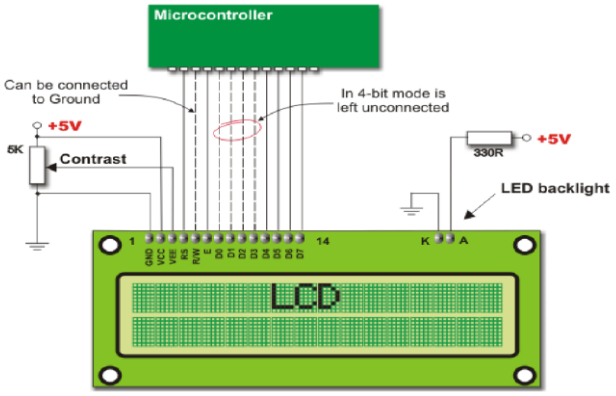


Fig 5:

Sensitive material of MQ-6 gas sensor is SnO2, which with lower conductivity in clean air. When the target flammable gas exists, the sensor's conductivity gets higher along with the gas concentration rising. Users can convert the change of conductivity to correspond output signal of gas concentration through a simple circuit.MQ-6 gas sensor can detect kinds of flammable gases, especially has high sensitivity to LPG (propane). It is a kind of low -cost sensor for many applications. This is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm.This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

e. LCD Display:



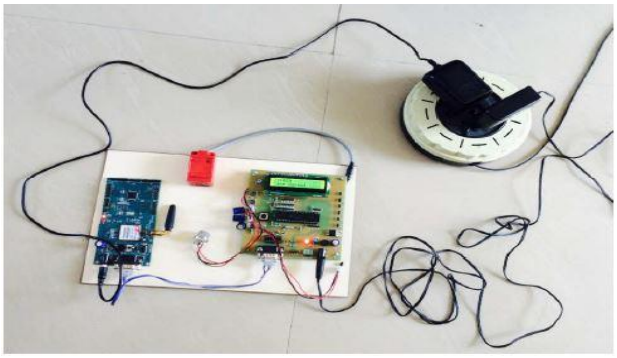
Liquid Crystal Displays (LCDs) have materials, which combine the properties of both liquids and crystals. These are used in a wide range of applications, including palmtop, computers, word processors, photocopiers, point of sale terminals, medical instruments, cellular phones, etc. The 16× 2 intelligent alphanumeric dot matrix displays is capable of displaying 224 different characters and symbols. They have the temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. LCD consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed. Two polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. A Liquid Crystal Display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly.

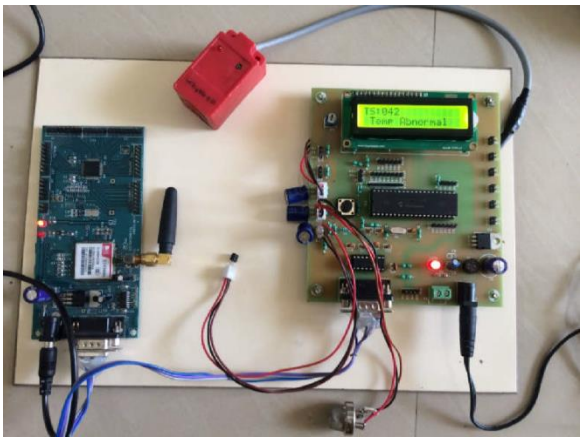
f. IOT Module-

Internet of Things (IOT) is an environment in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. IoT board featured with SIM900 GPRS modem to activate internet connection also equipped with a controller to process all input UART data to GPRS based online data. Data may be updated to a specific site or a social network by which the user can able to access the data.

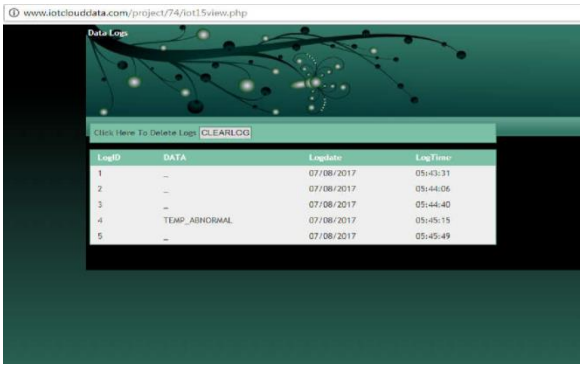
II. RESULT

The project setup can be seen in the below picture. Two separate adapters are connected to provide power supply to the IoT board and Microcontroller board.





Observe the values over Internet



Click Here To Delete Logs CLEARLOG

LogID	DATA	Logdate	LogTime
1	_	07/08/2017	05:43:31
2	_	07/08/2017	05:44:06
3	_	07/08/2017	05:44:40
4	TEMP_ABNORMAL	07/08/2017	05:45:15
5	_	07/08/2017	05:45:49
6	_	07/08/2017	05:46:23
7	_	07/08/2017	05:46:57
8	_	07/08/2017	05:47:31
9	_	07/08/2017	05:48:06
10	_	07/08/2017	05:48:40
11	VIBRATION	07/08/2017	05:49:14

III. CONCLUSION

This paper describes IoT Based Reconfigurable smart WSN unit for industrial safety parameters monitoring. The system can collect sensor data intelligently. It was designed based on application of wireless communication. It is very suitable for real-time and effective requirements of the high-speed data acquisition system in IoT environment. The application of PIC greatly simplifies the design of peripheral circuit, and makes the whole system more flexible and extensible. Different types of sensors can be used as long as they are connected to the system. Main design method of the reconfigurable smart sensor interface device is described in this paper. Finally, by taking industrial safety parameters monitoring in IoT environment as an example, we verified that the system achieved good effects in practical application. Nevertheless, many interesting directions are remaining for further researches in the area of WSN in IoT environment.

As IoT and WSN are based on technology areas strongly covered by the IEC, like smart

grid, industry and smart cities, to collect data about physical phenomena in various applications such as habitat monitoring, and ocean monitoring, and surveillance [7]–[9], it is important for the IEC to have a good understanding of the applications, the standardization environment, and the specific needs of WSN for the IEC stakeholders. In order to steer standardization in the right direction, and to identify and fill the standardization gaps, close cooperation within and outside the IEC is required.

IV. REFERANCES

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